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Report on BEREC International Mission to Canada

4 October, 2018

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Introduction and acknowledgements

BEREC Chair 2018 Mr Johannes Gungl (RTR), and the Vice-Chairs Mr Sebastien Soriano (ARCEP), Mr Jeremy Godfrey (COMREG), Mr George Michaelides (OCECPR), Mr Vladica Tintor (RATEL), accompanied by Ms Elisabeth Dornetshumer (RTR, BEREC CN Chair 2018) and Anne Lenfant (Director for Europe and International, ARCEP) travelled to Canada and the United States to meet institutional and industry stakeholders.

The meetings were held in Toronto, Ottawa, Montreal and Washington and covered several topics. The delegation was particularly interested in the following topics: 5G and net neutrality issues. Regarding 5G, from the discussions with the different stakeholders, it appears that Canada is making huge efforts to be in the leading countries in the race towards 5G deployment in which Europe intend to lead. Concerning Net neutrality issues -on which Canada was one of the first countries worldwide having rules that ensure the access to an open internet-, the CRTC reaffirmed its commitment to continue its current policy in favour of net neutrality protection.

The delegation was also impressed by innovation centres such as Communitech and the 'Quartier de l'innovation' in Montreal, playing the role of real open innovation hubs, where multiple actors from different sectors exchange and work together on common projects and experiments such as smart cities or artificial intelligence. Finally, the study trip was an occasion of the BEREC Chair and Vice-Chairs to engage in discussion with the Canadian Counterpart CRTC and to build a relationship for further cooperation.

We would like to warmly thank all the persons we met in Canada and the United States. ARCEP deserves special thanks for its involvement in the organisation of the trip.

About BEREC

The Body of European Regulators for Electronic Communications (BEREC) was established by Regulation (EC) No 1211/2009 of the European Parliament and of the Council of 25 November 2009, as part of the Telecom Reform package. BEREC brings together electronic communications regulatory authorities from EU Member States, candidate countries, as well as EFTA members. Its mission is to contribute to the development and better functioning of the internal market for electronic communications networks and services. In particular, BEREC develops and disseminates among NRAs regulatory best practices, such as common approaches, methodologies or guidelines on the implementation of the EU regulatory framework. BEREC also assists the European Commission and the national regulatory authorities (NRAs) in implementing the EU regulatory framework for electronic communications. It provides advice on request and on its own initiative to the European institutions, and complements at European level the regulatory tasks performed at national level by the NRAs.

BEREC has a system of rotating Chairmanship and the BEREC Chair of 2018 is from RTR, the Austrian NRA. The Board of BEREC, the Board of Regulators (BoR) is composed of one

member per Member State who is in general the President or a Board Member of the corresponding NRA.

BEREC's annual study trip

Each year, BEREC organises a visit to a non-member country to gain insights from the local electronic communications markets and digital ecosystem. During a typical study trip, the BEREC delegation meets representatives of the NRA, the relevant ministries, as well as incumbent operators, new entrants and other stakeholders in the industry. Past destinations include Japan, the USA, China and India.

1. Background information about Canada

Canada, the world's tenth largest economy (as ranked by 2016 GDP in US dollars), is a hightech industrial nation with abundant natural resources and a highly skilled labour force. Like many developed economies, Canada has a very large service sector, employing about three quarters of Canadians.

Economic development is heavily influenced by the neighbouring US which accounts for over three quarters of export and around 65% of imports. Following a robust performance in 2017, Canada's real GDP growth is expected to ease over the next two years as strong consumer spending gives way to improving capital investment and trade.

In the last two decades, Canada experienced solid improvements in living standards and quality of life.

The country scores among the top performing excellently in many well-being dimensions such as education and skills, health, etc. and the GDP per capita is above the OECD average.

Canada is the second largest country in terms of land with a population relatively small spread along a narrow strip from the Atlantic to the Pacific. Almost all Canadians are living within 100 kilometres or so of the United States border – most of them concentrated in a handful of major cities like Montreal, Toronto and Vancouver.

In such a large and relatively sparsely populated country the communications system acquires particular relevance representing one of the major threads holding the country together.

Communications have indeed always played a large role in Canadian affairs and have been the subject of continuous study and government support. Since the creation of Canada's domestic satellite system, telecommunications has been front and centre in the nation's scientific and industrial policies.



2. Canada's communications market

Canada's communication system is composed of two broad sectors: broadcasting and telecommunications. The competitive landscape in the communication system as a whole has remained mostly unchanged since 2015. Large vertically and horizontally integrated entities hold dominant market positions.

The top five broadcasting and telecommunications groups/entities (Bell Canada, Quebecor (Videotron), Rogers, TELUS, and Shaw/Corus) together accounted for approximately 83% of the total industry revenues in 2016, a slight increase compared to 2014 and 2015.

Canadian communications (telecommunications and broadcasting) revenues in 2016 totalled CA\$66.6 billion. Telecommunications services remain dominant with revenues that reached CA\$48.7 billion, while broadcasting revenues came in at CA\$17.9 billion. Telecommunications revenues represented 73% of the communications revenues compared to 27% for broadcasting.



The communications industry served over 14 million households and over a million businesses in Canada using both landline and wireless facilities.

The average Canadian household expenditure on communications services increased by 1.7% from \$214.75 per month in 2014 to \$218.42 per month in 2015.

The majority of Canadians' spending on communications services went to mobile wireless services (40%), followed by television services (25%), Internet services (21%), and telephone services (14%).

The Canadian telecommunications market comprises two major types of telecommunications service providers (TSPs):

- Facilities-based carriers, which own or operate transmission facilities in Canada.
- Resellers, which resell services of carriers or rely on the facilities of carriers to provide the reseller's competitive services.

There are three national carriers providing both wireless and wireline telecommunications services: Rogers Communications Canada Inc., Bell Canada Entreprises Inc. and TELUS Communications Inc. A fourth national service wireless and wireline carrier is emerging, through the recent launch by Shaw Communications Inc. of its wireless service.



Source : Telegeography

In addition to the national carriers, there are large regional carriers in most regions of Canada that provide wireless and wireline services, including Eastlink in the Atlantic Provinces, Vidéotron in Québec and SaskTel in Saskatchewan.

There are also wireline TSPs, some of which are facilities-based carriers that provide service nationally, including Distributel, TekSavvy and Comwave.

According to Telegeography, there are over 500 ISPs active in Canada, most of them small/regional, and many dependent on wholesale access to the large operators' DSL or cable broadband access networks.

2.1. Canadian Wireless Market

The wireless retail market remained the largest communications market sector, with revenues of \$23.2 billion in 2016. This included growth of 3.2% or \$720 million from 2015.

The cellular market remains dominated by the three well-established nationwide players, all of which have quadruple-play fixed, broadband, cellular and pay-TV empires — Rogers (10.6 million), Bell (9.0 million) and Telus (8.8 million). The national operators had 90% in terms of customers at the end of March 2017. A number of smaller, regional, facilities-based WSPs and a small number of mobile virtual network operators and resellers accounted for 10%. In both urban centres and rural communities, Canadians generally had a choice of between two and five WSPs.

One remarkable fact is Canada's relatively low cellular penetration rate (84% by end-March 2017). This could indicates that there is room for a fourth major player to make its mark alongside the three established nationwide mobile network operators (MNOs).

Wireless networks cover approximately 20% of Canada's geographic land mass and reach 99% of Canadians. The advanced wireless networks such as long-term evolution (LTE) and LTE-advanced (LTE-A), which deliver even higher speeds than previous generation networks, are available to approximately 98.5% and 83.0% of Canadians, respectively. Not only were these networks serving over 30.7 million Canadian subscribers, there were also over 3.0 million machine-to-machine connections reported in 2016.

In addition to advanced wireless networks such as LTE that provide broadband Internet access, WSPs significantly increased the number of publicly available WiFi hotspot locations (free and for-pay) across the country, from 14,000 at the end of 2014 to over 27,900 by the end of 2016. This provided Canadians with an additional method of accessing voice and data communications services on their handheld and other wireless communication devices. WiFi hot spots also provide wireless subscribers a means to minimize potential roaming charges.

Even if Canadians seem to have choice regarding wireless services, one of the most important issues in the market is the price of mobile services. The Canadian wireless market has been characterized by high price plans for a long time. In 2013, OECD ranked Canada among the most expensive countries in the OECD for wireless services in virtually every category.

Despites ISED interventions aimed at strengthening competition in the wireless market and fuel further innovation in the industry, recent studies comparing international pricing of wireless services still show that Canadian consumers and businesses continue paying more for many of the mobile wireless telecommunications services than people in other countries. The "2017 Price Comparison Study of Telecommunications Services in Canada and Select Foreign Jurisdictions" by ISED still confirmed how prices for larger wireless data packages remain high compared with other G7 countries. Among the findings, the report noted that within Canada, prices were lower in regions with four strong competitors, such as in Quebec, Saskatchewan and Manitoba. In regions with stronger competition, wireless prices indeed resulted as much as 31 percent lower than the national average.

2.2. Canadian Broadband Market

The Canadian broadband market is mainly dominated by five operators (BCE, Rogers, Shaw, Telus and Videotron) with more than 80% of market shares.

Cable broadband (provided by Rogers, Shaw, Videotron and a number of other smaller players) accounted for 52.6% of connections at the end of March 2017. xDSL connections have a 32.1% share (March 2017) and decline slowly as direct fibre connections are increasing (up to 12% by the end of 2017). The main operators are currently rolling out plans to offer higher connection speeds. In this respect, Bell Canada is leading the race in the Fiber technology thanks to its Fiber to the premises (FttP) program mainly focused on Ontario and Quebec provinces. The main cable operators replicated by upgrading their offers with DOCSIS 3.0-based broadband packages.

In Telecom Regulatory Policy 2016-496, the CRTC established criteria to measure the successful achievement of the universal service objective, which included the availability of a fixed broadband Internet access service with a downstream rate of at least 50 Megabits per second (Mbps) and an upstream rate of at least 10 Mbps, as well as the availability of an option for unlimited monthly data transfer (usage). As of 31 December 2016, services meeting these criteria were available to 84% of Canadian households. However, the availability varies greatly between urban and rural areas, with only 39% of rural households having access to this kind of service, versus 96% in urban areas. Overall, 11% of Canadian households subscribe to a service meeting these criteria. The Commission's objective was to have these speeds available to Canadians while subscription is at the discretion of the consumers.

While the majority of Canadians do not subscribe to a plan meeting the Commission's target speeds, Canadians are increasingly subscribing to faster Internet services.



According to the 2017 CRTC communications monitoring report, approximately 99% of Canadian households can access a download speed of at least 5 Mbps, which is sufficient for streaming high-quality audio and video content. The vast majority of Canadians (97%) can access this speed using either landline or fixed wireless facilities, and an additional 1.5% may get access via satellite facilities. 81% of Canadian households subscribe to services with download speeds of 5 Mbps or higher. When taking into account an upload speed of 1 Mbps, availability of 5 Mbps or higher Internet services declines to 97% (95% excluding satellite), with 67% of Canadian households subscribing to a service meeting these speeds.

Fixed wireless services are a major source of broadband Internet connectivity in rural areas, since 31% of rural households have access to broadband Internet via fixed wireless services, but not fibre, cable, or DSL. While satellite coverage is nationwide, capacity limitations restrict practical broadband Internet service availability to approximately 1.5% of all Canadian households. Additional coverage is available via LTE and HSPA+ networks, although data allowances may differ from satellite and wireline broadband.

3. Institutions and Regulatory Context

3.1. Innovation, Science and Economic Development Canada (ISED)

ISED with its headquarters in Ottawa is the federal government ministry responsible for telecoms policy, spectrum management and licensing. In particular, ISED is the department of the Government of Canada with a mandate of fostering a growing, competitive, and knowledge-based Canadian economy. ISED also represents Canada at the International Telecommunications Union.

Gaining its mandate from the Department of Industry Act 1995, the ministry defines its role as the "government's centre of microeconomic policy expertise for a wide range of sectors". ISED is a department with many entities that have distinct mandates, with program activities that are widely diverse and highly dependent on partnerships. It works on a broad range of matters related to industry and technology, trade and commerce, science, consumer affairs, corporations and corporate securities, competition and restraint of trade, weights and measures, bankruptcy and insolvency, intellectual property, investment, small business, and tourism.

Regarding telecoms, the two main Acts which are relevant and whose objectives are to be taken into account by ISED are the Telecommunications Act 1993 (most recently amended in Sept 2015), and the Radiocommunication Act 1985 (amended in June 2015) as well as various regulations subordinate to each of these two main acts.

Under the Radiocommunication Act, ISED has regulatory authority over radiofrequency spectrum licensing and the adoption of technical standards for, and certification of, radio apparatus that make use of radiofrequency spectrum. ISED is responsible for releasing authorization for the use of radiofrequency spectrum. There are two types of radio authorisations:

- Radio licences authorise the use of frequencies from a specific location or locations, such as a satellite earth station or a point-to-point microwave antenna.
- Spectrum licences cover the use of specific radio frequencies within a defined geographic area.

Most radio licences are granted through first-come, first-served licensing processes and their conditions vary depending on the proposed use of the spectrum by the apparatus. The Minister of Innovation, Science & Economic Development has ultimately the responsibility for managing the use of spectrum in accordance with the provisions of the Radiocommunication Act as set out in the 2007 Spectrum Policy Framework. In this context, ISED adopts various instruments, including licensing and the publication of framework documents.

The main instrument is the Canadian Table of Frequency Allocations (CTFA). This is a document published by ISED that indicates how radiofrequency spectrum is allocated to various services in Canada. The CTFA's allocations reflect those set by the International Telecommunications Union (ITU). ISED periodically revises the CTFA to reflect changes made

by the ITU at World Radio Conferences, and to reflect changes in spectrum allocations adopted by ISED.

Furthermore, ISED periodically issues a document called "spectrum outlook", in which it sets out its intended approach and planned activities in the next five years for allocating and licensing spectrum for various uses. ISED's most recent spectrum outlook was the Commercial Mobile Spectrum Outlook published in March 2013. ISED is currently consulting on the terms of the Spectrum Outlook 2018 to 2022. ISED also has a Framework for Spectrum Auctions in Canada (most recent issue published in March 2011), which sets out the various approaches that ISED uses for spectrum license auctions.

In June 2013, ISED published its Spectrum License Transfer Framework, aimed at improving competition by promoting at least four mobile network operators in each region. Under the rules, all spectrum transfer requests must be reviewed, and those that would result in 'undue spectrum concentration, and therefore diminish competition' are not permitted. Decisions on transfer requests are made on a case-by-case basis and issued publicly to increase transparency and clarity. The rules apply to all licence transfers, including prospective transfers that could arise from options and other agreements. This policy was applied by the ministry in June 2013 to block an attempted takeover of Mobilicity by Telus, which aborted its third and final attempt to buy Mobilicity in May 2014 due to conflicts with the Framework.

Nonetheless, ISED approved the sale of Mobilicity to Rogers in June 2015 due to the deal including a transfer of Mobilicity's spectrum to Wind Mobile and the sharing of cableco Shaw's unused AWS spectrum between Rogers and Wind.

In March 2013 the ministry set out the government's five-year 'Commercial Mobile Spectrum Outlook', aimed at issuing additional resources to meet mobile services demand, which included the auctions of spectrum in the 700 MHz (completed in February 2014), AWS-3 (March 2015 and August 2015) and 2500 MHz (April 2015) bands.

Finally, in June 2017 ISED launched a public consultation on releasing large amounts of spectrum to support the development and deployment of fifth-generation (5G) wireless networks by 2020. The initial consultation focused on releasing millimetre wave (mmWave) spectrum in the 28 GHz, 37 GHz - 40 GHz and 64 GHz - 71 GHz bands to enable providers to increase the capacity of their networks to meet the higher traffic demands of 5G.

Recently, on 28 March 2018, after nearly eight months of consultation, ISED published the framework for the March 2019 auction of 600 MHz spectrum licences. The auction is set to take place in March 2019 and will provide access to some of the first spectrum to be used in 5G applications in North America.

ISED is the federal institution that leads the Innovation, Science and Economic Development portfolio which consists of seventeen federal departments and agencies. Together, these organizations are uniquely positioned to further the government's goal of building a knowledge-based economy in all regions of Canada and to advance the government's jobs and growth agenda.

ISED works in partnership with the members of the Innovation, Science and Economic Development Portfolio to leverage resources and exploit synergies in a number of specific areas:

- innovation through science and technology helping firms and not-for-profit institutions more rapidly turn ideas into new products and services;
- trade and investment encouraging more firms in more sectors to export to more markets, and helping Canadian firms attract a larger share of foreign direct investment;
- growth of small and medium-sized enterprises providing access to capital, information and services;
- economic growth of Canadian communities fostering new approaches to community economic development, based on community strengths and information infrastructures.

Through the programs of the portfolio, ISED works to deliver Canada's Innovation Agenda, the centrepiece of the 2017 Budget and a whole-of-government initiative to "position Canada as a world-leading centre for innovation, create better jobs and opportunities for the middle class, drive growth across all industries and improve the living standards of all Canadians".

The Connect to Innovate program is a five-year program to stimulate economic activity, while supporting longer-term innovation objectives. Approved projects must be completed by 31 March 2021. The Connect to Innovate program aims to extend broadband access to currently unserved areas and underserved communities across Canada. It will invest CA\$500 million by 2021, to bring high-speed Internet to 300 rural and remote communities in Canada. In these communities, challenging geography and smaller populations present barriers to private sector investment in building, operating and maintaining infrastructure. This program supports new backbone infrastructure to connect institutions like schools and hospitals with a portion of funding for upgrades and "last-mile" infrastructure to households and businesses.

By focusing on backbone, Innovation, Science, and Economic Development (ISED) has designed a program that can complement the continued expansion of last mile networks, whether that's through private sector investment, programs from other levels of government, or as a result of regulatory decisions.

A portion of Connect to Innovate program funds also support "last-mile" connectivity projects to households, at speeds of at least 5 Mbps, where gaps continue to persist. Last-mile infrastructure brings Internet access from the backbone to end users like households or small businesses through familiar wired or wireless technologies, such as cable, digital subscriber line (DSL), fixed wireless or satellite. Without adequate last-mile infrastructure, Canadian consumers and businesses are not able to take advantage of the backbone infrastructure that may already exist in a community.

To advance the Innovation and Skills Agenda in February 2018 the Government launched a new funding initiative to accelerate innovation through superclusters – the Innovation Superclusters Initiative.

The Innovation Superclusters Initiative provides up to \$950 million to support business-led innovation superclusters with the greatest potential to energize the economy and become engines of growth.

On 15 February 2018 the Minister of Innovation, Science and Economic Development announced Canada's five superclusters: the Ocean Supercluster, the SCALE.AI Supercluster, the Advanced Manufacturing Supercluster (based in Ontario), the Protein Industries Supercluster and the Digital Technology Supercluster (based in British Columbia). All of them will use big data and digital technologies to unlock new potential in important sectors like healthcare, forestry, and manufacturing.

3.2. The Canadian Radio-television and Telecommunications Commission (CRTC)

Established under the Canadian Radio-television and Telecommunications Act, the CRTC is the main telecommunication regulator (while the Ministry of Innovation, Science and Economic Development (ISED) plays a regulatory role with respect to radio spectrum pursuant to the Radiocommunication Act).

CRTC is an independent public authority and administrative tribunal that regulates and supervises telecommunications and broadcasting in the public interest. The Telecommunications Act gives the CRTC the power to directly regulate carriers and resellers and contains a list of policy objectives for the CRTC to uphold. To a certain extent, the CRTC is engaged in assessing and ensuring a competitive market place for telecommunications services in Canada. This includes enforcing the anti-spam (whether by text, e-mail or other commercial electronic message) and unsolicited telecommunications (comprised of telemarketing and do-not-call list rules) regimes.

The CRTC is guided by Mr. Ian Scott (CRTC's Chairperson and Chief Executive Officer) and includes 13 top managers (including the chairperson, the vice-person of broadcasting, and the vice-person of telecommunications) appointed by the Cabinet for renewable terms of up to five years.

The CRTC Interconnection Steering Committee (CISC) assists in developing information, procedures and guidelines for the CRTC's regulatory activities. The CRTC mandate is entrusted by the Parliament of Canada and administered through the Minister of Canadian Heritage. The CRTC mandate focuses on achieving policy objectives established in the Broadcasting Act, Telecommunications Act and Canada's anti-spam legislation (CASL). The CRTC's jurisdictions include:

- approving tariffs and certain agreements for the telecoms sector;
- promoting compliance with telecoms regulations;
- encouraging competition in telecoms markets;
- issuing broadcasting licences and international telecoms licences;

• making decisions on mergers, acquisitions and ownership changes in the broadcasting sector.

Telecommunications service providers (TSPs), whether carriers or resellers, must register on the appropriate registration lists with the CRTC before providing services in Canada. There are various registration lists, such as "Reseller of Telecommunications Services", "Competitive Local Exchange Carrier", "Wireless Carrier" and "Other Carriers". Additionally, before providing telecommunications services between points in and outside Canada, a TSP must obtain a Basic International Telecommunications Service (BITS) licence from the CRTC.

The CRTC has the power to exempt a class of carrier from the application of the Act if it is satisfied that the exemption is consistent with Canadian telecommunications policy objectives (forbearance).

The CRTC preference has been to issue conditional forbearance orders rather than exemption orders to maintain the power to review alleged discriminatory practices.

The Telecommunications Act established the CRTC and requires the Commission to promote certain policy objectives, including the maintenance of Canada's identity and sovereignty, Canadian ownership and control of telecommunications carriers operating or providing services in Canada, the efficiency and competitiveness of Canadian telecommunications, public accessibility to high quality services and the provision of services at reasonable rates in light of market forces.

In exercising its powers under the Act, the CRTC must act with a view of implementing the defined objectives.

As mentioned above, one of the telecommunications policy objectives in the Telecommunications Act, which the CRTC must uphold, is to render reliable and affordable telecommunications services of high quality accessible to Canadians in both urban and rural areas in all regions of Canada. The CRTC sets the following regulatory measures to ensure this is achieved:

- Basic service objective This defines the basic services to which all Canadians should have access.
- Contribution regime This subsidises the provision of certain telecommunications services via a National Contribution Fund (NCF) to which all telecommunications service providers (TSPs) with CA\$10 million or more in annual Canadian telecommunications revenues must contribute a percentage of their contributioneligible revenues. The CRTC has set the interim contribution rate percentage at 0.54%.

NCF funds were used to subsidise the provision of residential local voice services to high-cost service areas, which are generally located in rural and remote parts of Canada. Later, they were also used to subsidise the provision of video relay services in Canada for the hearing-impaired. The CRTC has recently decided to phase out the subsidy for local telephone service over the next few years and to establish a new subsidy for the provision of broadband service in areas that do not have access to broadband service satisfying a new standard of 50 Mbps

downloading and 10 Mbps uploading (see below "Universal Service"). Proceedings are currently underway to establish the details of the new regime.

The CRTC's mandate includes the power to enquire and make determinations with respect to permitted or prohibited telecommunication activities. Moreover, the CRTC may issue guidelines or make regulations for carrying out the purposes and provisions of the Act.

The CRTC can impose administrative monetary penalties (AMPs) of varying levels (depending on whether the person is an individual or other, the frequency of the violation and a variety of other factors). The CRTC can designate inspectors for the purpose of verifying compliance or preventing non-compliance with the Telecommunications Act or any special act for which the CRTC is responsible. Inspectors can enter premises and gather information. The CRTC can also designate a person or class of person to issue notices of violations or accept undertakings.

Main decision taken by the CRTC over the past years:

Mobile TV and net neutrality: The CRTC issued a formal policy decision in February 2007 stating that V – defined as television programming broadcasted to cellular phones and other wireless handheld devices – would remain exempt from regulation. In a related matter regarding streaming mobile TV content in the context of net neutrality principles, however, Bell launched an appeal in February 2015 against the CRTC's ruling that Bell must cease the practice of 'zero rating' its own online TV content for mobile customers – i.e. discriminating between its own content and third-party content so as only the latter attracts data charges (with a deadline of 29 April 2015). In June 2016, the Federal Court of Appeal dismissed Bell's appeal of the CRTC's decision over its (now former) Bell Mobile TV service. In a similar ruling on net neutrality principles, in April 2017 the CRTC ordered Videotron to desist from offering unlimited online music streaming from Spotify, Google Music and other selected providers to its wireless customers without it counting against their data allowances by 19 July 2017.

Wholesale Mobile Wireless Services (Roaming): In 2015, the CRTC published Telecom Regulatory Policy 2015-177, in which it determined that it is necessary to regulate rates that Bell Mobility, Rogers, and TELUS charge other wireless carriers for domestic Global System for Mobile communications (GSM)-based wholesale roaming. These provisions will facilitate sustainable competition and provide benefits to Canadians, such as reasonable prices and innovative services, as well as continued innovation and investment in high-quality mobile wireless networks. In the decision, the CRTC expressed its intent to monitor the competitive conditions in the mobile wireless services market.

Prior to that decision, in March 2013 ISED issued the 'Revised Frameworks for Mandatory Roaming and Antenna Tower and Site Sharing'. The key measures included:

- extending roaming provisions indefinitely and expanding them to all carriers;
- requiring carriers to make available basic information on all towers to improve transparency and expedite the sharing process;
- shortening the timelines for arbitration between companies negotiating roaming/tower sharing agreements;

• prohibiting exclusive site arrangements to accelerate 4G mobile broadband expansion following the digital dividend auction.

You Have Choices: The CRTC launched an online tool that allows consumers to find television, Internet, mobile and home telephone service providers in their area. The CRTC also developed a checklist for consumers to use before shopping around for television services, along with suggestions for negotiating better television services with their provider.

The Wireless Code: Published by the CRTC in 2013, the Code outlines the rights and responsibilities of consumers of wireless services, and applies to all wireless contracts ensuring that consumers of wireless services could better understand their contracts, establishing consumer-friendly business practices, significantly limiting the early cancellation fees that were previously sought by retail WSPs; and enabling consumers to take advantage of competitive offers at least every two years. In 2016, approximately 91% of post-paid plan subscribers had contracts that were equal to or less than two years in length, compared to 67% in 2014 and 44% in 2013. In late 2016, the CRTC launched the first review of the Wireless Code since it came into effect in December 2013. The review looked at consumer concerns surrounding issues such as bill shock, unlocking fees on all devices, and trial periods. As a result of the review, many Canadians benefit from the revisions that were set out in mid-2017 in Telecom Regulatory Policy 2017-200.

Wireless Roaming Regulation – Universal Service: Furthermore, the CRTC issued Telecom Regulatory Policy 2016-496, in which it established a universal service objective (USO) framework that aims to help Canadians participate in the digital economy and society. One of the key components in the USO is the importance of wireless services. The goal is for Canadians, in urban areas as well as in rural and remote areas, to have access to voice services and broadband Internet access services, on both fixed and mobile wireless networks.

In particular, the CRTC has declared broadband Internet a basic telecommunications service, recognizing that access to broadband services was vital to Canada's economic, social, democratic, and cultural fabric.

The CRTC has expanded the definition of universal service from voice to include broadband concluding therefore that broadband must be available to all Canadians, including those living in the remote North.

The Commission also set performance requirements including speed and quality of service, and target dates to cover unserved areas and underserved populations.

In particular, with the December 2016 ruling, the CRTC has set new targets for Internet service providers to offer customers in all parts of the country download speeds of at least 50 Mbps and upload speeds of at least 10 Mbps, and to also offer the option of unlimited data.

To achieve this goal, the CRTC will require providers pay into a fund that is set to grow to \$750 million over five years. The companies will be able to access into that fund to help pay for the infrastructure needed to extend high-speed service to areas where it is not currently available.

The CRTC estimates two million Canadian households, or roughly 18%, do not have access to those speeds or data. The CRTC's goal is to reduce that to 10% by 2021 and down to zero in the next 10 to 15 years.

To help attain the universal service objective, the CRTC will begin to shift the focus of its regulatory frameworks from wireline voice services to broadband Internet access services.

In particular, to support continued access to broadband Internet access services in underserved areas, the Commission intends to phase out the local service subsidy regime and to establish a new funding mechanism for broadband Internet access services. The CRTC is also establishing regulatory measures to address issues related to accessibility for persons with disabilities and consumer empowerment.

The CRTC will monitor progress towards achieving the universal service objective and closing the gaps in connectivity by continuing to collaborate with partners and by expanding its data collection process, as appropriate.

The main objectives of this decision are:

- Canadians in urban, rural, and remote areas can access affordable, high-quality telecommunications services;
- telecommunications companies continue to invest in and various levels of government continue to fund robust infrastructure that can be upgraded in the future and that is capable of providing high-quality telecommunications services to Canadians across the country;
- Canadians can access innovative service offerings that enhance social and economic development; and
- Canadians can make informed decisions about their telecommunications services.

4. Key insights from meetings with Stakeholders in the ECS and IT sectors

During the study trip, the BEREC delegation met with a range of stakeholders representing ECS operators, IT/IoT ecosystem including start-ups and established companies, consultancies as well as representatives from regulatory authorities and relevant government ministries.

This chapter provides a summary of the key insights and facts about the Canadian ECS market.

The Canadian ECS market is a highly concentrated market with three nationwide operators (Bell, Rogers, Telus) having a market share of about 90%. The market is characterized by very strict ownership restrictions, meaning that if a telco provider has a market share of more than 10% it must be fully Canadian owned. The main large players are all vertically integrated operators offering in addition to the traditional telco services also content and own their own TV channels, radio stations, print media and even sport teams etc.

Apart from the three main operators, there are few smaller regional fixed network operators (cable providers, fiber operators) and in some regions also a fourth mobile operator. In principle, more than 80% of Canadian households have access to at least two fixed infrastructure operators.

As a result of this high concentration, consumers complain about the lack of attractive offers and high prices for telco services. This is one of the reasons why the Canadian institutions are promoting market entry especially for mobile operators. ISED therefore reserves spectrum in the upcoming 600 MHz for new regional mobile entrants.

The discussion about 5G showed that the perceptions and expectations about 5G in Canada are more less the same as in Europe. For the residential customers, it is seen as an upgrade of 4G, but there is much more potential when it comes to IoT, smart cities, connected cars and so on. A number of pilot projects have been launched in different regions (Toronto, Montreal, Quebec-Ontario). As a main challenge for the deployment of 5G it was mentioned by operators mainly the small cell deployment (especially difficult in a country with very low population density) and access to sites and street furniture. However, operators still see a number of obstacles for a successful deployment of 5G such as planning permissions, handling times etc. for building additional sites.

The BEREC delegation had the opportunity to visit innovation centers, such as Communitech or 'Quartier de l'innovation', where multiple actors from different sectors exchange and work together on common projects and experiments such as smart cities or artificial intelligence. When exchanging with start-up communities and these innovation centers, the BEREC delegation, learnt that the traditional telecom operators are not always interested to be part of these innovation centres. The main feedback received from those organisations was that "we innovate despite the telcos".

The BEREC delegation was also very interested to discuss with different stakeholders and institutions about net neutrality. Canada was one of the first countries worldwide having rules

that ensure the access to an open internet. The Canadian regulatory authority already adopted a number of decisions and guidelines to safeguard an open internet and during the discussion with the board members, they reaffirmed that there is no discussion to change this systems in the near future. So, the discussion on net neutrality in the US and the change of rules has not, to date, swapped over to Canada. Operators in principle acknowledge the approach taken by CRTC, nevertheless, they would like to have some more flexibility.

A topic that was not on our agenda when going to Canada and also when stopping by in Washington was the GDPR. The study trip took place at the time when Mark Zuckerberg from Facebook had to speak in front of the US congress and provide some explanations on the latest affairs with Cambridge Analytica. Therefore, we received many questions from stakeholder, institutions and civil society about the GDPR and its implementation in Europe. From the discussion, it was clear that the GDPR in Europe was very closely followed in Canada and many think that some kind of regulation in this area is also needed in Canada and the United States.

5. Overview and brief summary of meetings held by the BEREC delegation

5.1. Mark Goldberg – Consultant

Mark Goldberg is head of Mark H. Goldberg & Associates, Inc., a telecommunications industry consulting practice that specializes in assisting its clients to understand the implications of changes in competitive markets. Drawing on more than 35 years of global industry experience, for 20 years the firm has assisted clients in Canada and around the world in all sectors of the industry: new entrants and incumbents, end users,



manufacturers and software suppliers, government regulators and industry associations. In the course of his corporate careers, he gained the perspective and led changes from many perspectives of telecommunications: communications service providers, regulation, research and development, equipment architectures and large customer networks.

Mr Goldberg provided the BEREC delegation a broad overview of the Canadian ECS market – the market players, the level of competition, the regulatory framework and background about the institutional environment.

5.2. Rogers Communications



Rogers Communications was founded by Edward Samuel Rogers, Jr. in 1960 and is headquartered in Toronto, Canada.

Rogers is a diversified communications and media company, which engages in providing wireless communications services. The company operates its business through four segments: Wireless, Cable, Business Solutions, and Media.

Rogers Communications, which is owned by the Rogers family, is one of the three main operators in Canada. During our visit they provided us information about their business and the services they are offering. They call themselves a multi-media carrier meaning that they are providing in addition to the traditional telco services radio and TV services, also owning their own Channels and sports teams. We discussed with Rogers upcoming challenges such as the deployment of 5G and the net neutrality regulation in Canada. Rogers, in return, were very interested to hear about the GDPR implementation in Europe.

5.3. Communitech and Velocity

Communitech was founded in 1997 by a group of entrepreneurs committed to making Waterloo Region a global innovation leader. It is a publicprivate innovation hub that supports a community of more than 1400 companies from start-ups to scale-ups to large global players.

Communitech partners in building a worldleading ecosystem. It helps tech companies start, grow and succeed. Communitech delivers programs – helping companies at all stages with



access to capital, customers and talent. The Communitech Hub is 80,000+ square feet dedicated to world-leading collaboration and innovation bringing together key players – from start-ups and global brands, to government agencies, academic institutions, tech incubators and accelerators.

5.4. Communitech – Data hub

The Communitech Data Hub brings together key players – from start-ups and global brands, to government agencies and academic institutions – to inspire persistent innovation and revolutionize the way data is leveraged. They offer programs and support for data innovators.

The BEREC delegation learnt about the work done by the data hub which is mainly bringing companies together that provide data with those that use it. This is especially interesting for sectors like banking where for example all the transactions are provided to a neutral third party that focuses on aggregation of data. On the



questions if and in which way traditional telcos are involved in their work, we were told that they are struggling, as they are not the ones that innovate. So according to them "innovation takes place despite the telcos". Regarding the question about privacy and data security, we were informed that the companies in Canada are following with interest the discussion about GDPR implementation in Europe.

5.5. Citizen Lab – Meeting with Mr. Bram Abramson

Mr. Bram Abramson has been Chief Legal and Regulatory Officer at Teksavvy Solutions Inc., since 2 April 2014. Mr. Abramson joined TekSavvy from a major national law firm, where he advised a broad range of service providers and investors on network regulation and tariffing, media distribution and licensing, spectrum allocation, emergency communications, and

broadcast and telecom mergers and acquisitions. Prior becoming to а communications lawyer, he worked in telecom – strategy and policy. At TeleGeography, telecom а global analysis and mapping firm, he led research international Internet on infrastructure. At the Canadian Radiotelevision and Telecommunications Commission, he worked as a Senior Financial Analyst within the regulatory telecommunications bodv's branch. where he was involved with what is now



the annual Communications Monitoring Report. He has consistently been ranked by the Chambers Global directory as an up and coming telecommunications and broadcasting lawyer in Canada. Additionally, he is an adjunct professor of communications law at Osgoode Hall Law School, co-author of the Regulatory Guide to Canadian Television, and past chair of the Canadian Bar Association's national Entertainment, Media and Communications Law section.

Mr. Abramson gave us an overview of the Canadian telecommunication market from a consumer perspective. There are numerous consumer complaints especially regarding high prices and the choices they have. The delegation discussed with the participants of the Citizen Lab net neutrality issues and we were informed about the NN rules in Canada and how they are applied.

5.6. Beanfield

Beanfield Metroconnect is a privately held, Canadian-owned company, based out of Liberty Village which offers fibre broadband and emerged as alternative option to traditional phone and cable companies in major urban centres, more specifically, in Toronto. The company, which started as an IT support operation in the 1990s, has in recent years been moving towards providing





residential broadband.

Already selling fibre-optic based telecom services to business in more than 600 office buildings (mainly in the Greater Toronto Area but also in Montreal) the company is taking aim at the new target: the home.

Beanfield, a small fibre company, is very different to the large operators in Canada: they have facilities in major cities in Canada. A few years ago, they started to offer services for residential customers by building their own infrastructure. They mentioned that the access to buildings as well as access to content – which is essential in Canada – is still very challenging for them. Even the regulator CRTC only has very little power to intervene. The discussion about NN showed that Beanfield is of the view that NN is very important for democracy and fully supports and is committed to the rules.

5.7. Quartier de l'Innovation

World class experimented laboratory, the Quartier de l'Innovation (QI) was officially launched in 2013 under an academic initiative. In addition to the four university members – Ecole de technologie superieure, McGill University, Concordia University, and Université



du Québec à Montréal – the QI is financially supported by the City of Montréal, the Government of Quebec and the Government of Canada. The mission of this alliance is to foster a one-of-a-kind innovation ecosystem where experimentation and collaboration between academics, entrepreneurs and residents generate benefits for society.



Le Quartier de l'Innovation is an innovation cluster in Montreal that tries to bring with a kind of bottom-up approach different sectors together for innovation. As an example they mentioned some social projects such as how to support autistic children or how to facilitate the lives of elderly people. On the question of the role of the telcos in this regard, the answer was that they are invited to take part,

however, they are not interested. When discussing about 5G, the BEREC delegation learnt that an open area laboratory of smart life was launched in 2013 together with companies like Ericsson, Videotron and others where the idea was to develop new infrastructure that enable smart cities.

5.8. Videotron

Videotron is a wholly-owned subsidiary of Québecor Média inc., partially owned by Capital d'Amérique CDPQ inc. and is integrated communications an in cable company engaged interactive multimedia broadcasting, development, Internet access services, telephony and wireless telephone



services. Videotron has had, for many years, a great reputation thanks to its network of coaxial and fibre-optic cables (HFC) in which millions of dollars are invested each year to ensure it stays at the forefront of technology. As a technology and entertainment leader, Videotron differentiates itself through innovative products and multiplatform content offerings.

The BEREC delegation discussed with Videotron the main challenges of 5G and the main challenges to deploy. One of the biggest challenges in their view will be access to sites – it is difficult to get the necessary permission to build sites, there are large regional differences and long handling times. In discussion about net neutrality, Videotron explained a CRTC decision about their unlimited music offer which was forbidden.

5.9. Ericsson

Ericsson is one of the leading providers of Information and Communication Technology (ICT) to service providers, with about 40% of the world's mobile traffic carried through their networks. They enable the full value of connectivity by creating game-changing technology and services that are easy to use, adopt and scale, making their customers successful in a fully connected world. For more than 140 years, their ideas, technology and people have changed the world: real turning points that have



transformed lives, industries and society as a whole. Ericsson's comprehensive portfolio ranges across Networks, Digital Services, Managed Services and Emerging Business; powered by 5G and IoT platforms.

Ericsson provided some insights in their activities in North America, especially the Canadian market. In addition, they presented the Canadian roadmap regarding spectrum in 5G and some background information about the licensing regime for spectrum (licensed vs. unlicensed spectrum, minimum licence duration etc). Their conclusion on 5G was that it is very different from 4G and that the industry is still learning. Ericsson kindly offered us to visit their "Ericsson garage" which is a kind of landing zone for projects where Ericsson is involved.

5.10. Terry Matthews / Wesley Clover International

Sir Terence Matthews is the founder and Chairman of Wesley Clover International, an investment management firm and holding company. Today, Wesley Clover has interests in a broad range of next-generation ICT companies,



as well as real estate, leisure properties and philanthropic activities. Terry is Chairman of a number of these private and publicly traded companies, and he sits as a Director on the Boards of several others. Wesley Clover founds and funds start-ups around the globe, directly and in partnership with local governments, academic institutions and like-minded businesspersons. The company invests exclusively in ICT technology opportunities where its strategic advantages can best be leveraged. Key among those advantages is the 'Alacrity' investment model": a hands-on investment program.

5.11. Michael A. Geist, professor at the University of Ottawa

Dr. Michael Geist is a law professor at the University of Ottawa where he holds the Canada Research Chair in Internet and E-commerce Law and is a member of the Centre for Law, Technology and Society. Dr. Geist's column on technology law issues regularly appears in the

Globe and Mail. He is the editor of several copyright books, the editor of several monthly technology law publications, and the author of a popular blog on Internet and intellectual property law issues. Dr. Geist serves on many boards, including the Canadian Internet Registration Authority board, Internet Archive Canada board, and the Electronic Frontier Foundation Advisory Board. Dr. Micheal Geist is a strong supporter of net neutrality and published



several articles on net neutrality in Canada focusing in particular on the possible effects of the FCC decision on Canadian's consumers. On the subject, he also appeared before the House of Commons Standing Committee on Access to Information, Privacy & Ethics.

5.12. ISED



The Minister of Innovation, Science and Economic Development Canada (ISED) is the federal government ministry responsible for telecoms policy, spectrum management and licensing. Gaining its mandate from the Department of Industry Act 1995, the ministry defines

its role as the government's 'centre of microeconomic policy expertise' for a wide range of sectors. ISED works with Canadians in all areas of the economy and in all parts of the country to improve conditions for investment, enhance Canada's innovation performance, increase Canada's share of global trade and build a fair, efficient and competitive marketplace. It invests in science and technology to generate knowledge and equip Canadians with the skills and training they need to compete and prosper in the global, knowledge-based economy.

ISED leads the Innovation, Science and Economic Development portfolio made up of seventeen federal departments and organizations. Together, these organizations are uniquely positioned to further the government's goal of building a knowledge-based economy in all regions of Canada and to advance the government's jobs and growth agenda.

The BEREC delegation was discussing with ISED mainly about spectrum, coverage and 5G. ISED provided interesting information about their spectrum planning for the next five years for mid and low band spectrum. There are plans to auction off the 600 MHz spectrum in the near future. One of the objectives for the authorisation of the 600 MHZ spectrum is to reserve spectrum for a new entrant to increase the competitive landscape. The licence duration will be 20 years with some options for renewal. For higher band spectrum ISED is currently analysing different options of allocation (licenced or unlicensed spectrum) that ensure efficient use.

5.13. CRTC

The Canadian Radio-television and Telecommunications Commission (CRTC), established under the Canadian Radio-television and Telecommunications Act, is the main telecommunication regulator in Canada. The CRTC is an independent public authority and administrative tribunal that regulates and supervises telecommunications and broadcasting in the public interest.

The BEREC delegation had very interesting discussions with CRTC about access regulation, universal service, consumer issues and, last but not least, CRTC gave an overview of the net neutrality principles in Canada, which was one of the first countries having rules in place that mainly consist of two regulatory frameworks: internet traffic management practices framework and differential pricing practices framework.



5.14. EU Delegation to Canada

The Delegation of the European Union to Canada was established in 1976. It is a fully-fledged diplomatic mission and works closely with the diplomatic missions of the EU Member States. The Head of the Delegation is formally accredited as the official representative of the European Union to the Government of Canada with



the rank and courtesy title of Ambassador. The Delegation has three sections: Political and Public Affairs, Trade and Economic Section and Administration. The Delegation's main role,

vis-à-vis the Canadian authorities and other groups, is to promote in Canada the positions and policies of the European Union and (as defined in the EU Treaty) those of the European Union as a whole. It conducts an active public diplomacy and information service, aimed at informing Canadians about current developments in the European Union. The Delegation also keeps the Union in Brussels abreast of significant developments in Canada.

The BEREC delegation had a very good exchange about the experiences and impressions both institutions made/have about the Canadian market. The study trip was very much appreciated by the EU Delegation which also encouraged BEREC to continue the discussion and the exchange with the Canadian authorities.

5.15. Stop by in Washington

On their way back home, the BEREC delegation made a stop in Washington to meet the most important institutions namely, the FCC, the FTC and the NTIA there. The BEREC delegation there had the opportunity to discuss with them their new approach regarding net neutrality. In addition, we had very interesting discussions about licensing spectrum for 5G. We learnt about their plans for the upcoming auction for the 28 and 24 GHz spectrum, as well as about their ideas for creating databases to coordinate use of spectrum.

Apart from the institutions, we also met with the Civil Society to hear their views on the latest decisions on net neutrality. An interesting take-away from the discussions was their interest in the implementation of the GDPR in Europe and their lobbying activities towards a similar regulation in the United States.

5.15.1. Access Now / Center for Democracy and Technology and Free Press

Access Now is an international non-profit, human rights, public policy, and advocacy group dedicated to an open and free Internet.

Access Now has championed a number of digital rights issues since it was founded in 2009, with an emphasis on five major policy areas: digital security, freedom of expression, privacy, net discrimination, and business and human rights. The organization has campaigned against internet shutdowns, online censorship, international trade agreements, and government surveillance. Access Now has also supported net neutrality, mobile phone tracking, the use of encryption, and thoughtful cybersecurity laws and regulations. Access Now's campaignes

target various stakeholders in support of its mission, including governments or technology companies. It also engages with telecommunications companies on a variety of issues, such as transparency reporting.



5.15.2. FTC

The FTC is a bipartisan federal agency with a unique dual mission to protect consumers and promote competition. For one hundred years, the collegial and consensus-driven agency has

championed the interests of American consumers. In the second century, the FTC is dedicated to advancing consumer interests while encouraging innovation and competition in our dynamic economy.

The FTC develops policy and research tools through hearings, workshops, and conferences. lt collaborates with law enforcement partners across the country and around the world to advance our crucial protection and consumer competition missions. And beyond our borders, we cooperate with international agencies and organizations to protect consumers in the global marketplace.



5.15.3. FCC

The Federal Communications Commission regulates interstate and international communications by radio, television, wire, satellite and cable in all 50 states, the District of Columbia and U.S. territories. An independent U.S. government agency overseen by Congress, the commission is the United States' primary authority for communications



law, regulation and technological innovation. In its work facing economic opportunities and challenges associated with rapidly evolving advances in global communications, the agency capitalizes on its competencies in:

- Promoting competition, innovation and investment in broadband services and facilities
- Supporting the nation's economy by ensuring an appropriate competitive framework for the unfolding of the communications revolution
- Encouraging the highest and best use of spectrum domestically and internationally
- Revising media regulations so that new technologies flourish alongside diversity and localism
- Providing leadership in strengthening the defense of the nation's communications infrastructure

5.15.4. National Telecommunications and Information Administration (NTIA)

The National Telecommunications and Information Administration (NTIA), located within the Department of Commerce, is the Executive Branch agency that is principally responsible by law for advising the President on telecommunications and information issues. NTIA's policy programs and policymaking focus largely on expanding broadband Internet access and adoption in America, expanding the use of spectrum by all users, and ensuring that the Internet



remains an engine for continued innovation and economic growth. These goals are critical to America's competitiveness in the 21st century global economy and to addressing many of the nation's most pressing needs, such as improving education, health care, and public safety.

Specific NTIA activities include:

- Managing the Federal use of spectrum and identifying additional spectrum for commercial use;
- Administering grant programs that further the deployment and use of broadband and other technologies in America;
- Developing policy on issues related to the Internet economy, including online privacy, copyright protection, cybersecurity, and the global free flow of information online;
- Promoting the stability and security of the Internet's domain name system through its participation on behalf of the U.S. government in Internet Corporation for Assigned Names and Numbers (ICANN) activities; and
- Performing cutting-edge telecommunications research and engineering with both Federal government and private sector partners.

In addition to working with other Executive Branch agencies to develop Administration positions, NTIA represents the Executive Branch in both domestic and international telecommunications and information policy activities. NTIA is also a leading source of research and data on the status of broadband availability and adoption in America.